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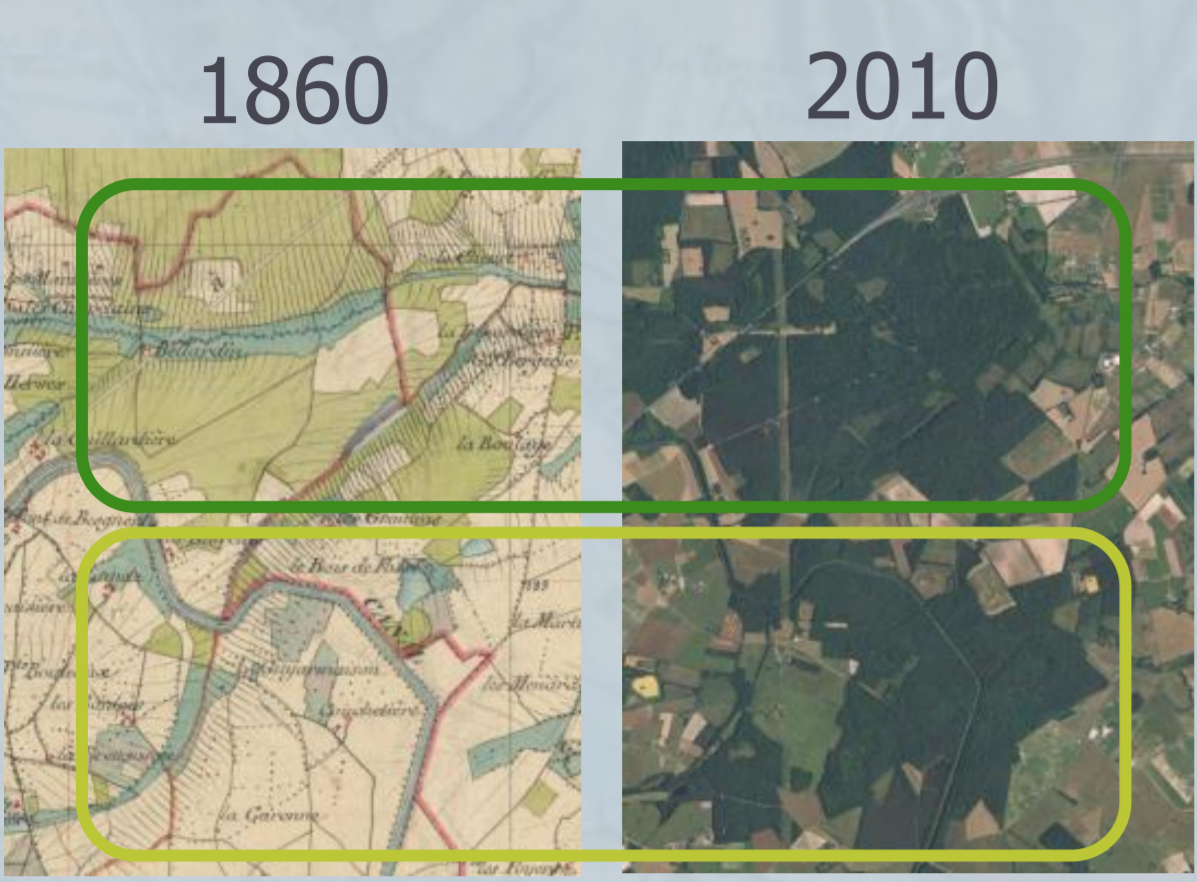
Effects of past land use on Mediterranean forest understory vegetation

Juliet ABADIE ⁽¹⁾, Laurent BERGÈS ⁽²⁾, Catherine AVON ⁽³⁾, Sophie GACHET ⁽⁴⁾, Thierry TATONI ⁽⁴⁾

Why is history important for forest biodiversity?

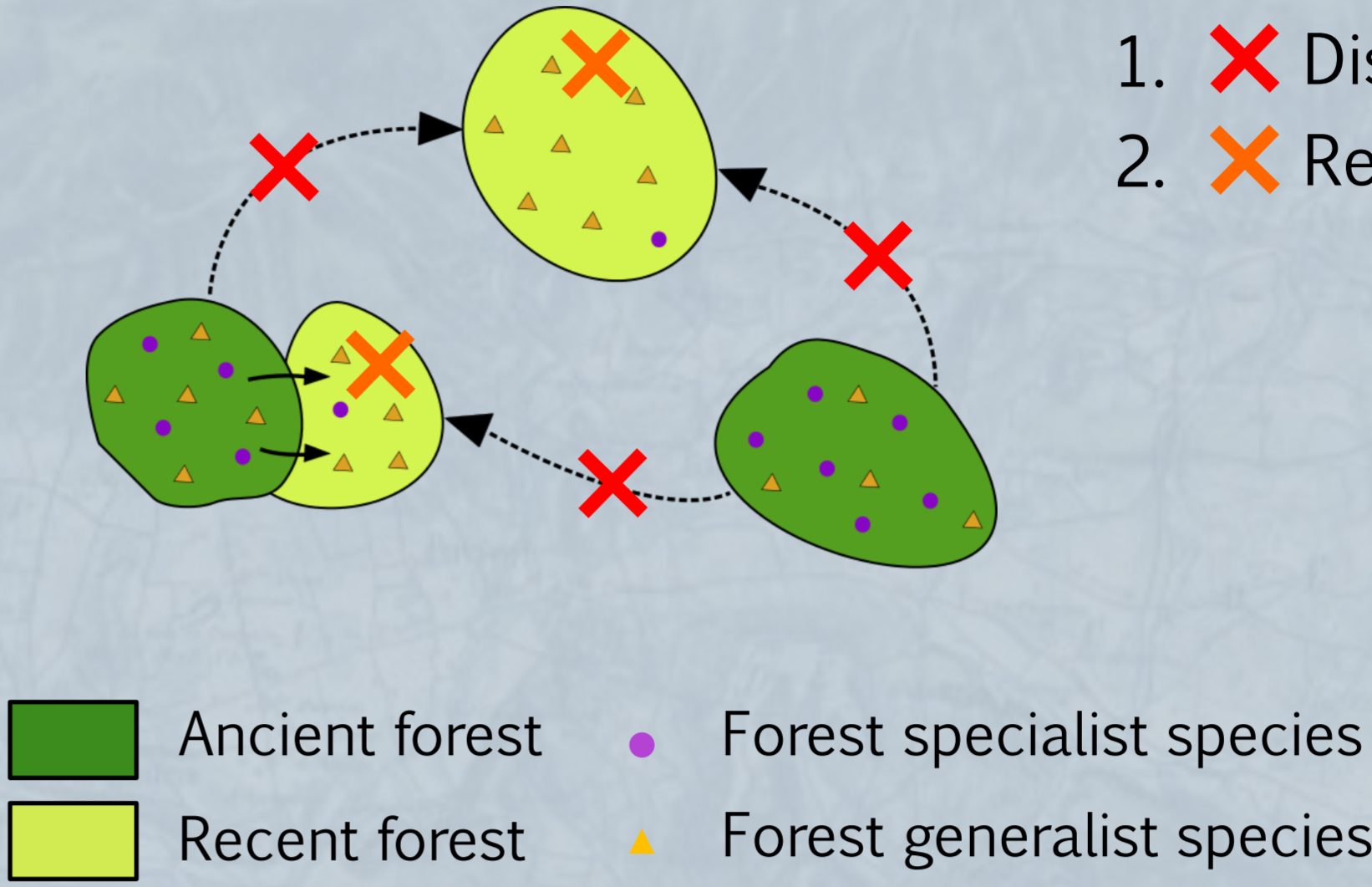
Knowing the past helps us understand the structure and functioning of present ecosystems but also assess conservation objectives. History of ecosystems have been particularly studied in temperate forests, highlighting two kinds of forests according to their temporal continuity : ancient forests and recent forests.

Ancient and recent forests differ in flora and soil physico-chemical properties:



	Flora	Soils
ANCIENT FOREST	Myrmecochorous, stress-tolerant species 	P ⁻ H ⁺ Organic matter N C/N
RECENT FOREST	Zoochorous, competitive species 	P ⁻ H ⁺ Organic matter N C/N

Why those differences ?



1. ✗ Dispersal limitation
2. ✗ Recruitment limitation

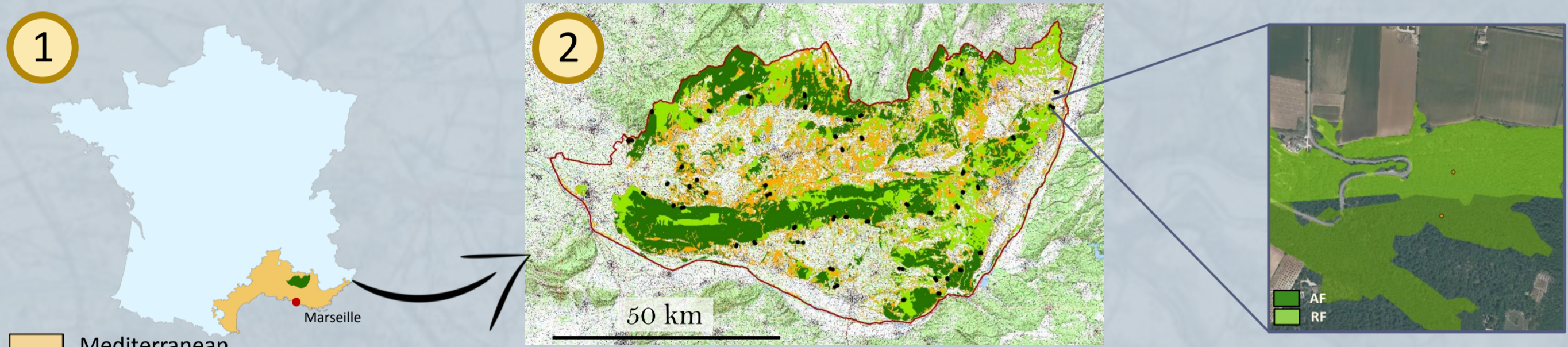


OUR AIM : Analyse the effect of past land use on forest plant species and soil physico-chemical properties, and identify life-history traits associated to those differences in a Mediterranean context.

Do Mediterranean forest flora respond to past land use?

Hypothesis: Plant species communities and soils differ between ancient and recent forests in the Mediterranean region, but differences are less pronounced because former land use in recent forests were ecologically similar to forests compared to temperate regions.

Methods



- 1 Study area: the Regional Natural Park of Luberon
- 2 Sampling design: Forest continuity map created with 1860 land use map and 2010 land use map. 100 paired plots in adjacent AF and RF. Sampling plan stratified according to past land use (forest, “pâquis” or arable land) and stand species (*Q. ilex*, *Q. pubescens*, *P. halepensis*). Past land use remnants (absence, stone removal or terrace) was recorded systematically.

Plant survey

- 200 m²
- Exhaustive inventory
- Every specimen < 2m high
- Presence & abundance

Soil sample

- 3 random subsamples
- 0 – 15 cm
- all subsamples were pooled and mixed
- soil samples were air dried and sieved at 2 mm before being analysed

Traits & Ecological preferences

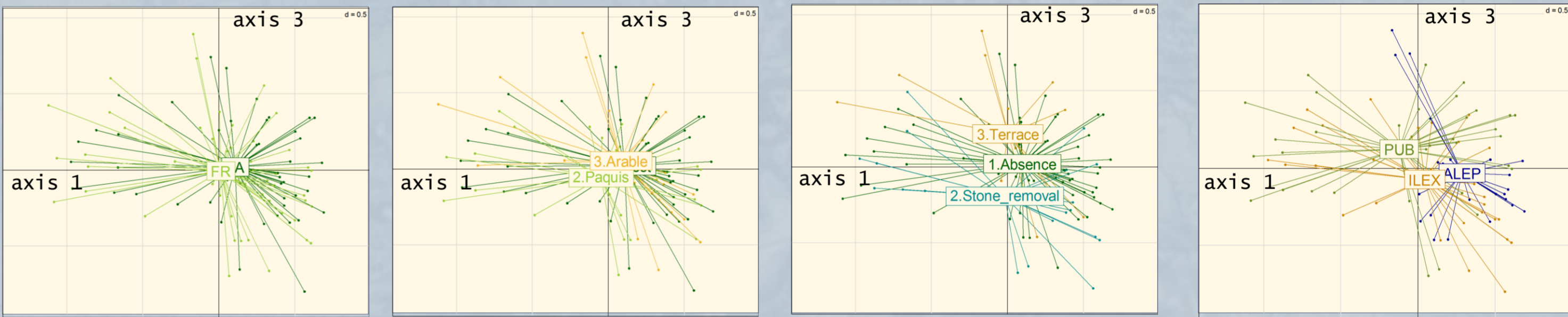
- Dispersal mode
- Flowering phenology
- Raunkiaer life form
- Grime CSR
- Plant height
- Vegetative reproduction
- Life cycle
- Ecological preferences

Soil analyses

- Total Nitrogen (N tot)
- C/N ratio (C/N)
- Phosphorous
- Organic matter (mo)
- pH
- Total lime content
- Active lime content
- Clay
- Silt
- Sand
- Coarse fragments

Results

Effect of past land use on species composition?



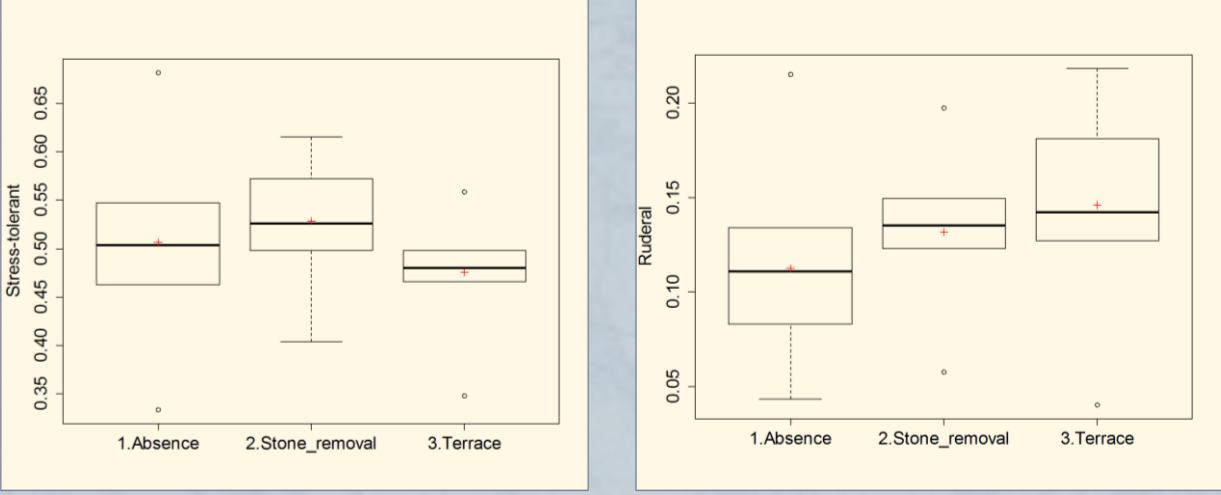
The CCA analysis shows that species communities are strongly structured by the stand main species ($p = 0.04$). Forest continuity *per se* seems to have no impact on forest plant communities. Past land use remnants seem to have an effect on plant species composition but with no significance.

... on species presence?

Using a logistic regression model, we show that only 7 out of 135 species respond to past land use when accounting for local variables, such as stand species, slope or soil characteristics. All those species were preferentially present in recent forests or on plots with stone removal or terrace.

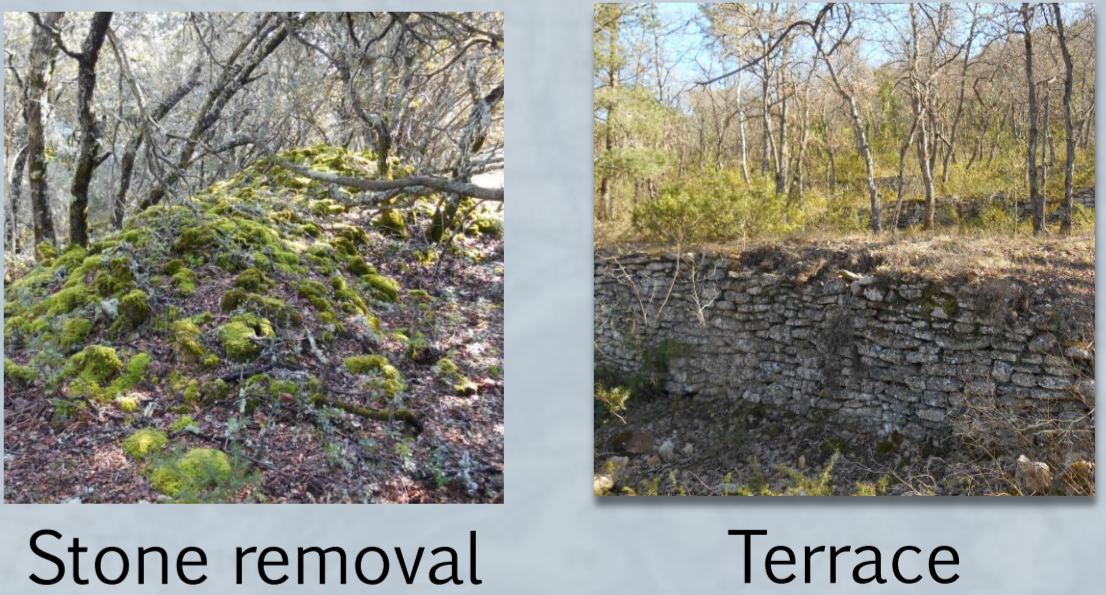
... on trait richness?

Past land use have no effect on species trait richness, but past land use remnants seem to be related to Grime CSR strategies.



... on soil properties?

Here again, past land use remnants had a much stronger effect on soil physico-chemical properties of forest soils than past land use: soils are deeper, contain less organic matter, have a lower C/N ratio, and have a higher pG than soils with no PLU remnants or with stone removal.



What next?

This study shows little impact of past land use on soils and forest flora in the Mediterranean region. Besides, the effect of past land use remnants seem more relevant than past land use extracted from the ancient map. The analysis of two large databases could help to confirm or not those results. Indeed, a large amount of data was collected from the SILENE and IFN flora inventory databases and are still being analysed. A landscape analysis will then be carried out to test if the difference in the response to forest continuity observed between the Mediterranean region and temperate regions results from different impacts of past land uses or from an overall differing fragmentation context.

